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MUS HIBERNICUS, THOMPSON, RESTORED TO THE BRITISH FAUNA.*

THE discovery of this almost forgotten and neglected mammal in the Outer Hebrides is not only important, since a significant extension is thereby added to its limited geographical range, but also because it re-opens for consideration the history and status of the creature itself, which it is thought most desirable should be undertaken.

To the fauna of these islands the presence of this peculiar Irish quadruped must be regarded as an important link in the chain of evidence bearing upon the general zoological relationship of the archipelago—a link in strict consonance with the views of the late Mr. E. R. Alston.

The occurrence of a Black Rat in the islands had been known many years to Mr. Alexander Carmichael, but to Dr. John MacRury our thanks are due for reminding us of the fact, and finally enabling us to add a new species to the fauna of Scotland and to Great Britain. This gentleman reported the Black Rat as occurring there in a letter dated the 21st of August last, after

* From Messrs. Harvie Brown and Buckley's recently published 'Fauna of the Outer Hebrides' (8vo, Edinburgh, 1889), of which a review will shortly be given. In a future number, by favour of the authors and publisher, we propose to reproduce the plate given of this animal.

the mammalian portion of our book had been printed. A desire was at once expressed to see specimens, and a reward offered to the inhabitants for their capture. This resulted in our receiving two specimens in spirit, and these proved on inspection to be the species described by Thompson as *Mus hibernicus*, a species which had not hitherto, we believe, been recorded out of Ireland.

It is not deemed advisable to enter into detail on the Hebridean range of this animal, but it is only withheld in the interests of a species limited not only in its distribution, but also in its numbers. Regarding its habits, &c., we give the following extracts from notes, kindly communicated to us by Dr. MacRury. This gentleman says: there seems to be little difference between their habits and those of the Brown Rat; the latter predominates, but it is thought the black species is holding its own; although they are not very numerous they seem to be more so than they were within the recollection of the inhabitants. They appear to be most numerous on the sandy portions of the island, though found elsewhere upon it; and they affect barns and outhouses, but Dr. MacRury never heard of their being seen in dwelling-houses.

As to the claims of this mammal to specific rank, and as regards its characters, general description, and history, we quote the words of our friend Mr. W. Eagle Clarke, of the Natural History Department of the Edinburgh Museum of Science and Art, who has most kindly undertaken a thorough examination of *M. hibernicus* and its relationship to the larger species of the British *Muridæ*—a service which it affords us much pleasure to acknowledge. Mr. Eagle Clarke reports as follows:—

On the 13th of June, 1837, Mr. William Thompson, the well-known author of the 'Natural History of Ireland,' in a communication* to the Zoological Society of London, described and exhibited a new species of rat under the name of *Mus hibernicus* = Irish Rat. In this Mr. Thompson tells us that although he had heard of the animal before, yet it was not, he says, "Until April last, when a specimen was sent from Rathfriland, county of Down, to the Belfast Museum, I had not an

* For full account see 'Proceedings of the Zoological Society,' 1837, pp. 52, 53.

opportunity of either seeing or examining the animal. This individual differs from the *M. rattus* . . . . in the relative proportion of the tail to that of the head and body; in having shorter ears, and in their being better clothed with hair, as is the tail likewise; and in the fur of the body being of a softer texture. The difference in colour between the *M. rattus* and the present specimen is, that the latter exhibits a somewhat triangular spot of pure white extending about nine lines below the breast, and the fore feet being of the same colour. . . . . These differences incline me to consider this animal distinct from *M. rattus*, and being unable to find any species described with which it accords, I propose to name it provisionally *Mus hibernicus*."

It is not a little remarkable that after the careful examination made by Thompson, as is evidenced by his published detailed account, that this excellent naturalist should have associated this animal with *M. rattus*, an error of judgment which is repeated in his 'Natural History of Ireland' (vol. iv. p. 16), published in 1856, where it is obviously considered to be a mere variety of the Black Rat—an error perpetuated up to the date of issue of the second edition of Bell's 'British Quadrupeds,' where the animal is merely alluded to as a variety of *M. rattus;* and down to the present time, the primary fact of its colour being black seems to have exercised not only a misleading but a lasting influence on our naturalists.

Since Thompson's investigations *M. hibernicus* appears to have received practically no attention at the hands of zoologists; at least, endeavours to procure further published observations on it have failed. Its discovery, however, in the Outer Hebrides has re-opened the question, and the writer has to express his obligations to the authors of this work for the opportunity afforded him of examining and reporting upon their specimens received in the flesh, as well as a series of skins furnished by their obliging correspondents.

Before proceeding to the consideration of the true status of *Mus hibernicus*, it is desirable to institute a comparative examination of the British species of rats. This is conveniently and sufficiently afforded by the following tabulated information:—

	Mus rattus (from Bell).		*Mus alexandrinus.**		*Mus decumanus.*		*Mus hibernicus.*	
	in.	lin.	in.	lin.	in.	lin.	in.	lin.
Length of head and body . .	7	0	7	4½	9	1	8	6
„ of head	1	9	2	0	2	0½	2	4
„ of ears	0	10	1	1½	0	9	0	8½
Width of ears	...		0	9	0	7	0	7
Length of tail	7	6	8	11	7	1	7	6
„ of fore feet and claws .	0	8¼	0	9	0	10	0	8
„ of hind feet and claws .	1	4¼	...		1	8	1	7¼

The four species readily fall into two groups:—

1. The *Long-tailed* and *Large-eared species*, in which the tail is longer than the head and body, and the ears comparatively large. *M. rattus* and *M. alexandrinus* belong to this section.

2. The *Short-tailed* and *Small-eared species*, in which the tail is shorter than the head and body, and the ears comparatively small. *M. decumanus* and *M. hibernicus* belong to this section.

This results in *M. hibernicus* being more nearly allied to *M. decumanus* than to *M. rattus*, with which it has hitherto been associated. This is most undoubtedly the case, and is borne out by a careful examination of the other characters of the two animals. Indeed, if specific rank be not conceded to *M. hibernicus*, then it must be regarded as a variety of *M. decumanus*.

It is now necessary to state the differences which lead to the belief that *M. hibernicus* may be something more than a variety. Briefly stated, they are:—

1st. It is a smaller and more elegant animal than *M. decumanus*, which is a much coarser creature in build and other characters.†

* From H.M.S. 'Devastation.' Forwarded in the flesh by Capt. J. R. N. Macfarlane, R.N.

† Since the above was written I have been much indebted to Mr. G. Barrett Hamilton, of Kilmanock, Co. Wexford, for many valuable notes. Mr. Hamilton informs me that he has had specimens of *M. hibernicus* equal in length to ordinary specimens of *M. decumanus*, but that the former were always lighter in weight; he also tells me that the head and tail are proportionately longer in *M. hibernicus* than in *M. decumanus*. I think it is possible, however, that melanic varieties of *M. decumanus* may sometimes be confounded with *M. hibernicus*.

2nd. The fur is finer in texture, and silky to the touch. In this respect it is even finer than *M. rattus*, and affords marked contrast to the rough and somewhat harsh coat of *M. decumanus*.

3rd. In the general colour of the fur, and its constancy in shade.

4th. In its peculiar and circumscribed distribution. This singularly limited and isolated western range, in which it has been so long known to exist in some numbers, is most remarkable and important, and, taken together with the fact that it does not appear to have been recorded for the mainland of Great Britain, nor from Europe, affords weighty evidence against *M. hibernicus* being regarded as of varietal value only.

The following table shows the comparative measurements of *M. hibernicus* and *M. decumanus*, and are taken from specimens while in the flesh :—

	Mus hibernicus.				*Mus decumanus.*			
	Male.		Female.		Male.		Female.	
	in.	lin.	in.	lin.	in.	lin.	in.	lin.
Length of head and body . .	8	5	8	3	9	7½	9	1
„ of head	2	4	2	0	2	0½	2	0½
„ of ears	0	8½	0	9	0	10½	0	9
„ of tail	7	5	7	8	7	3	7	1
„ of fore feet and claws .	0	8	0	9	0	10	0	10
„ of hind feet and claws .	1	7	1	8	1	7	1	8

DESCRIPTION.—The fur is glossy. The hairs on the back are of two kinds—a longer, which is white at the roots and darkens gradually to the tips, which are black; and under this a shorter fur, of an ashy grey colour. The general colour of the upper surface is dark silvery grey, almost black. This shades into a paler tint on the sides. The under surface and limbs silvery mouse-grey. The head is slightly browner than the back, with the muzzle mouse-grey. The digits silvery white. The white stripe, regarded as *the* important diagnostic character by Thompson, does not possess that value. In both Hebridean and Irish examples examined by me, the specimens wanting the stripe have been as numerous as those possessing it, so that it may be commoner to this than to *M. rattus* and *M. decumanus*, in both of which it is said occasionally to occur. When present in *Mus*

hibernicus it forms a patch or stripe extending from between the fore limbs backwards, sometimes for a length of one inch and a half.

I regret that, owing to the scarcity of material, it has not yet been possible to make a complete examination of the osteological characters, if any, of *M. hibernicus*. The results of this and of further general research and comparisons are deferred for a future occasion.

A male having the white stripe, and a female, are figured, both Hebridean specimens, and have been kindly presented to the Museum of Science and Art, Edinburgh.

ON THE PRODUCTION OF COLOUR IN BIRDS' EGGS.

By A. H. S. Lucas, M.A., Oxon., B.Sc. Lond.*

The question of the cause of the coloration of birds' eggs has often been referred to, but has not, to my knowledge, been adequately treated of in any work on Oology. Perhaps we may consider the latest views on the subject to be those enunciated by Mr. H. Seebohm in his lecture at the London Institution, December 20, 1886.† I had published in the Melbourne 'Leader' of December 26, 1885, a popular account of the colours of Australian birds' eggs, in which I advanced suggestions which seemed to me to throw light on the subject. After reading the abstract in 'Nature' of the interesting lecture by this high authority, I have thought it worth while to make a more formal scientific record of the ideas broached in the 'Leader.'

My hypotheses may well be encountered with criticism, but they do serve at least very conveniently to connect a multitude of facts together. The antiquity of the Australian Avi-Fauna, and the preservation of ancient types, render a comprehensive consideration of Australian eggs of the greater value. My suggestions have been founded on studies of large collections, and after a certain amount of experience in the field. Australian eggs yield a rich abundance of facts which are of scientific

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* From the Trans. and Proc. Roy. Soc. Victoria, vol. xxiv, pp. 52—60.

† Printed in 'The Zoologist,' 1887, pp. 137—139.

interest *per se*, and which will be of still higher value if we can discern their bearing on biological problems.

We take it that the natural or original colour of birds' eggs is the pure white of the mineral substance (carbonate of lime) of which they are composed, just as the natural colour of bone is white, and that, too, of the shells of mollusca, &c. All shells are secreted by animal membranes. In the mollusca, an external layer of membrane usually remains free from admixture of mineral matter, as an animal epidermis, which can be peeled off. But this is not the case with birds' eggs; they possess a membranous lining, generally white, occasionally brownish or bluish, but outside this the animal substance and mineral matter are intimately commingled to the very surface. Colour, if produced, is then, in almost all eggs, ingrained. Often it can be detected incorporated in the inner layers of the shell, as blotches beneath the surface.

Birds' eggs have many foes. Even where man has not appeared upon the scene, a number of systematic nest-robbers exist. Snakes, the great Lace-Lizard (*Hydrosaurus* or *Varanus varius*), which takes such liberties with the settlers' hen roosts, the "native cats" (*Dasyurus viverrinus* and *D. maculatus*), perhaps the Bush Rats, and last, but by no means least, other birds, and especially the crows, are very destructive of our native birds' eggs, and of the young birds in the nest. To such intruders pure white eggs would be a conspicuous and gratuitous advertisement, and the birds would be exposed to undue danger while in the egg. As has been remarked hundreds of times before, we accordingly find that white eggs, and especially eggs of shining or pearly whiteness, are almost always found in nests which either conceal the eggs completely, or which are themselves completely concealed. Thus the cookatoos, parrots, parrakeets, and other members of the family, in almost all cases, build in holes of trees, usually high up and quite out of reach. Owls build in holes of large gum trees; Kingfishers, including the Laughing Jackass (*Dacelo gigas*) in holes of trees or banks; the Diamond Birds, the Roller, and Bee-eater, in holes in trees or in burrows. The Penguins and many of the Petrels lay their eggs at the extremities of long burrows in the ground, facing the sea. The eggs of all of these birds are white.

The eggs of the doves, pigeons, and podarguses, are

beautifully white, often shining as if enamelled. The birds construct slight nests of twigs, placed crosswise on horizontal branches of trees. Much light can pass through the interstices between the twigs, and it is a difficult matter, even for the trained human eye, to detect from below whether there are eggs in the nest or not. Here the white, light-reflecting eggs are at a positive advantage.

The Australian finches conceal their eggs in the depths of relatively huge covered baggy nests, provided with side spout-like entrances. The eggs are in no way visible from without, are securely stowed away, and are pure white. All of the English finches, on the contrary, lay in open nests, and the eggs are spotted, usually, too, on a neutral-tinted ground. In this case we may presume that we have preserved the ancestral type in Australia.

Since a glaring uniform white must be a dangerous colour for exposed eggs, we are not surprised to find that variations, favourable to preservation, have been originated and preserved, and that colour is now a protection to the great majority of eggs. In all cases we have to consider two questions:—(1) How could the colour have been acquired? and (2) How is the colour now protective or otherwise beneficial? That natural selection would be called into play to preserve favourable markings or tints we may allow, but we believe, with Mr. Seebohm, that "natural selection is not the cause of evolution" in this case, "but only its guide."

The first question then is, How could the colour have been acquired? and I do not know that anyone has attempted hitherto to give any answer to it. The following has occurred to me as a probable explanation of the process; at least the phenomena are referred back to principles already recognised:—

In the first place, it is important to note that the shell of the ovum is formed in the third portion of the oviduct ("the uterus"), and entirely during the 12—18 hours which immediately precede the expulsion or laying of the egg. This is the length of the period in the case of the common fowl; we may assume, generally, a similar number of hours, probably shorter, in the case of the smaller species. That the formation of the shell is a process distinct from the formation of the yolk, is further brought before us strikingly, by an experiment of

M. Tarkhanoff. He introduced a small ball of amber into the upper part of the ovarium, and obtained later on a quite normal egg, with chalazæ, albumen, and shell, but with the ball of amber in place of a yolk.

At the breeding season, the females of certain animals are well known to be especially impressionable, and we think that the effect of the surroundings during the time of the formation of the shell, upon the mental or nervous constitution of the bird, is a main factor in the production of colour in the eggs. Any variations of value are seized on by natural selection, and transmitted by the principle of heredity. Individuals at the present day are influenced in part by the surroundings, but mainly restricted by the tribal habits of generations. We have, in fact, sufficient adherence to type for an experienced collector to be tolerably sure of the species of bird to which a particular egg belongs, but sufficient variation to make him wonder at the differences which often exist between eggs of the same clutch. As we find in all groups, that some species are more stable and less variable than others, so the eggs of some birds are apparently fixed in colour and pattern, while those of others vary within wide limits.

We will now consider in detail the influence of surroundings, and the utility of the effects produced.

The general tint of the egg is often protective. The colour of the ground prominently before the vision of the laying bird, is reproduced in various shades in the eggs of the Pheasants and Partridges, and in our Mallee hen (*Leipoa ocellata*) and Megapode. In the rich brown variety of the egg of the domestic fowl, we probably see the colour developed in the feral state, now usually lost by reversion to the original white, as there is no longer advantage to be gained by its retention.

In addition to the protective ground tint, darker spots and markings lend further security. The eggs of the Sandpipers and Dotterels cannot be distinguished, even when seen from the sands on which they lie, without close concentration of the attention. Grouse and Quail, Rails and Night-jars, Plovers and Terns, Oyster-catchers and Gulls, all lay on the ground, with or without nests, and the eggs exhibit different shades of the soil or of the rocks, with an appropriate ornamentation of spots, blotches, and smears.

White eggs become similarly less conspicuous if the white be broken up by the introduction of spots or blotches of shading. This is a very simple, but by no means ineffective, means of avoiding detection. The eggs of the Australian Shrike-thrushes, White-winged Corcorax, and Frontal Shrike-tits, are good instances of exposed white eggs so protected. In many families it is noteworthy that those kinds of eggs which are quite concealed are white, while those which are exposed are speckled or freckled. In the Tree Swallows and Martins, we find a graduated series. The eggs of the English Sand Martin, laid at the ends of tunnels in soft sandstone, are quite white. Those of the Australian Tree Martin which lays in spouts of trees, are very slightly spotted. Those of the Fairy Martin, laying in social colonies, under the eaves of houses, &c., are more freely flecked. Lastly, the English swallow, and the Australian Welcome Swallow, which builds under bridges, or in shallow spouts of trees, in more exposed situations, are plentifully covered with spots. So amongst English Titmice (a family wanting in Australia), the only purely white eggs are those of the long-tailed Titmouse, whose long and roomy mossy nest, with side entrance, often contains a clutch of a dozen or fourteen eggs. The warblers, the larks, and the honey-eaters, are other families of birds with spotted eggs.

The experiments of Jacob (Genesis xxx. 37—43) are recorded as having been successful in producing mottled colours in the animals under his charge. By the simple device of placing green rods before them at the time of conception, in which he "pilled white strakes, and made the white appear which was in the rods." "And the flocks conceived before the rods, and brought forth cattle ring-straked, *speckled* and *spotted*." It is then not difficult to understand that surrounding objects of very different appearance, but of unequally coloured surface, might as readily produce spots and speckles on bird's eggs, as on the skins of mammals.

In the case of the Honey-eaters, we may venture a surmise as to what the parti-coloured objects are which produce the spotted eggs. The eggs of these birds are of various shades of ground colour, white, buff, salmon, flesh-coloured, with small dots or flecks of purple, chestnut, reddish-brown, or even black. The birds, as their name denotes, may be seen busily extracting the honey from the flowers by means of their long tongues.

Familiarity with pale and warm-tinted flowers, and with the dotted orange, red, purple, or black anthers, may possibly account for the coloration of this type of egg.

Many birds which nest in trees or bushes have eggs which are of a pale or darker green ground hue, speckled or splashed over with olive or brown, reminding one of the different shades of the surrounding foliage, and, moreover, difficult to see from a distance through a bower of leaves. Such are the eggs of the Crows, Magpies, and Crow-shrikes, the species of Grauculus, the English Blackbirds, and the Australian Mountain Thrush and Robins [*Petroica*, *Drymodes*, &c.]. In this case both origin and use of the colour are apparent.

Eggs with irregular streaky lines of bizarre appearance are found in a few families. In England, the Yellowhammers and Buntings are good examples. In Australia, we have the *Pomatostomi*. The eggs of the latter are about an inch long, and three quarters of an inch at the widest, olive-brown, with all kinds of hieroglyphic pencillings in black. Both families line their nests with hair, and the eggs are protected by their resemblance to the lining of the nest. Gould similarly remarks, in speaking of the Victorian Lyre-bird, "the colour resembles, in fact so closely that of the feathers with which the nest is lined, that it is not easy to detect the egg."

Eggs of a pale bluish or greenish uniform tint are common. Such neutral tints are found in the Grebes, Cormorants, Swans, Ducks, and Geese, the Mangrove Bitterns, the Glossy Ibis; and attaining to the deepest and loveliest shade in the Herons. Just as the hue of the eggs of the Pheasants, &c., may have been suggested by that of mother earth ever before their eyes, so these tints of the water-birds' eggs may have arisen from the contemplation of vast sheets of water, and the consequent impression upon the mental organisation of the parents. This peculiarity of colour, too, has been of service in rendering the eggs less easy of detection, as being of neutral hues, or as resembling, more or less, the water around or near the nest.

But the brightest blues of all occur, very exceptionally, in groups of birds of totally different habits, in no way adapted to an aquatic life. Such are, for instance, amongst English birds, the Thrush and the Starling, the Hedge Sparrow and Lesser Redpoll, the Wheatear, and to a less extent, the Stonechat and

Whinchat. Amongst Australian birds, are those of the naturalised Indian or Ceylon Mynah, the Coach-whip bird, and the Wedge-bill, and the species of *Zosterops*, a small family allied to the Honey-eaters. Such examples, it is to be noted, are extremely scarce. It is difficult to surmise the causes which can have combined to produce this unique coloration. If the "motive" be protection, it must fall under the general principle that intruders are shy of the brightly coloured objects. Some support for this view may be derived from Mr. Bates' well-known observations on deterrent colours amongst insects. It is difficult, moreover, to discover a blue in the surroundings of the birds, which could produce so pronounced a mental conception of this colour. It may be the blue of the butterflies on which they feed. It may be the blue of the aërial vault above. It would seem, if this second suggestion be the right one, that very few indeed of the birds have their attention attracted strongly by the azure of the skies, while they occupy their aërial homes.

The eggs of the Ostrich vie in colour with the pale yellow sand of the African desert, in which they are buried for the sake of incubation by the sun's heat*; but those of the Emu, laid in the Australian bush, are, as every one knows, dark green. Here we have an indication that the Australian bush is not made up of yellow sandy deserts. The Emu, in fact, scoops out a hole in the ground amongst low scrub, and contemplates eucalypts and salt-bush, and other dull vegetation. Its eggs are exposed, and protected by their colour. The Cassowary, laying and living amongst the bright green of the tropical grasses and the vivid green of a more diversified tropical foliage, produces lighter and brighter green eggs.

With the birds of prey the mental perception of habitual surroundings seems to have been intense (as might have been expected from their known keenness of vision), and the influence upon the colouring of the eggs remarkable. The nests of the Eagles, Falcons, and Hawks are large, and exposed on the tops of trees or on the ledges of lofty cliffs. The eggs are generally more or less blotched with rusty red, presenting a marked resemblance to old blood spots, such as the family are so well acquainted with. The Nankeen Kestrel breeds in spouts of

* This is a misapprehension. The process of hatching is performed by the male and female sitting alternately. See 'Nature,' 22nd March, 1883.—Ed.

trees, where, of course, the colour cannot be protective, yet the eggs retain the family peculiarity. Here we see natural selection apparently ruled out of court, and mental receptivity as the sole cause of the variations in the one specified direction. The eggs of the other members of the family are, from their situation, inaccessible, and it therefore seems very questionable whether the factor of natural selection has operated at all in the case of the eggs of this group. We find very different degrees of development of the blotches. In one clutch of the Sparrow Hawk *(Accipiter torquatus)* one egg was white, a second smudged, and the third well blotched. In a clutch of the Goshawk *(Astur approximans)*, again, one egg was smudged, one smudged and blotched, and the other blotched. Similar gradations are to be observed in the average colour of the species. The eggs of the Harriers *(Circus)*, which lay on or near the ground, and generally among thick scrub, and those of the Crested Hawk *(Baza subcristata)*, which builds in the holes of trees, are pure white; and we have gradually more and more colour introduced, until the climax is reached by the Brown Hawks *(Ieracidea berigora)* and Kestrels *(Tinnunculus cenchroides)*.

Great irregularity, and much variation amongst individuals, characterise eggs which derive their colour from changing and varying appearances. We obtain thus a natural explanation of the infinite variety of colouring in the eggs of the rapacious birds, and of such birds as the Magpies and the Sparrows.

Many birds continue to protect their eggs themselves, consciously or unconsciously. Some, as the Partridge, will cover up the eggs when they leave the nest. The Grebes lay eggs which are at first white, but become stained by mud from the body of the sitting mother bird, usually brown, and gradually browner, a tint well in keeping with the colour of the nest of dead reeds and leaves. Many of the sea birds, too, by fouling their eggs, no doubt materially assist in preserving them.

The English Cuckoo commonly chooses the nests of Larks or of Wagtails for its egg. When found in the nest of a Lark, especially of a Tit-lark, the egg is very dark; and when found in that of a Wagtail, much lighter. This looks like proof positive of the effect of mental impression in producing the colour of the egg. More rarely, the egg of the Cuckoo is found in other nests, such as that of the Hedge Sparrow. It is most

likely that in this case, the Cuckoo had in the course of nature laid its egg, and not being able to find an appropriate nest near, was driven to make use of that readiest to hand. For nothing could be more conspicuous than the contrast between the colours of the eggs. Our Victorian Cuckoos are likewise eclectics. The Pallid Cuckoo often plants its cream or flesh-coloured and spotted eggs in the nests of Honey-eaters, the eggs of which its own thus resemble. The Bronze Cuckoo patronises the dome-shaped nests of little birds, in which the egg will not be seen, and into which it doubtless conveys its eggs by means of the bill, for the Cuckoo is much too large a bird to obtain entrance into the nest by the tiny opening which serves for the rightful owners. The Brush and the Narrow-billed Cuckoos place their eggs in the nests of superb Warblers and Acanthizas, and the eggs of both are white, with very fine dots.

The subject it will be seen is as yet still entirely in the domain of observation. Experiments are wanting. It is to be hoped that they will be forthcoming. Opportunities exist, notably in the case of the domestic birds, and of birds which breed easily in confinement. But we must not expect too much, to be able to produce extreme effects. Mr. E. B. Poulton's interesting series of experiments on the production of colour in the pupæ of certain British Lepidoptera, show that the capacity for variation in each species is (for a single generation) limited, and that the variations tend in quite definite directions. It is probable, however, that results of sufficient, and perhaps in some cases of striking, interest are to be obtained by careful and systematic experimentation. And the field is open.

A CUCKOO HATCHING ITS OWN EGGS.

[In an article in 'Die Gartenlaube,' vol. xxxvi., No. 25, 1888, Herr Oberförster Adolf Müller, who has the reputation of being a good observer, has detailed his observations in a case which came under his notice of a female Cuckoo incubating and hatching her own egg. The case is so abnormal and interesting that we had intended translating the article for publication in this Journal; but as the Editor of 'The Ibis,' in the last number of that periodical, has saved us the trouble, we may help to make the case more widely known amongst ornithologists by quoting his translation, with due acknowledgment and thanks. In return we may save our contemporary some

trouble by appending a translation of an article by Herr A. Walter, of Cassel (Journ. für Orn. 1889, pp. 33—40, in which the views of Herr Müller are seriously questioned and criticised.—Ed.]

Herr Müller says:—On the morning of May 16th, 1888, when I was looking over a young plantation in my district of the Royal Forest of Hohenschied, a Cuckoo rose suddenly out of the bushes close to me, which, from its pale brownish colour, I recognised as a female bird. I soon discovered, in a slight depression of the ground near the spot whence the bird flew up, three eggs, which attracted my attention from not being all of the same coloration, and from one of the three being of considerably smaller size than the other two. As I could not recognize the eggs as belonging to any of our smaller birds that breed on the ground, and as the Cuckoo kept flying about me in a curious way, I resolved to conceal myself under a neighbouring hedge in order to watch the bird more closely. After I had been there a few minutes I saw the Cuckoo alight on the ground and crawl towards the place where the eggs were. My idea now was that the Cuckoo was intending to add her egg to the three already there, and I accordingly remained in my hiding-place at least three-quarters of an hour, without seeing the Cuckoo take its departure. This long delay, and the circumstance that no other nesting-bird made its appearance in the neighbourhood, led me to suspeot that this must be an exceptional case, and made me very eager to investigate it. I therefore cautiously approached the spot, and soon saw the Cuckoo again rise from the ground. On this occasion, after wheeling round in a half-circle, it retreated further off into the forest. A closer examination of the eggs convinced me that two of them presented no remarkable differences in size or structure, although the ground colour was certainly not the same. I recognized them as Cuckoos' eggs of very fine grain and thin shell. One of them was of the characteristic yellowish white or pale waxy ground colour, with dark brown points and a few streaks and scratches. The second, of the same size, was of a reddish yellow or clay-colour, thickly covered with oil-coloured markings, so that it was something like an egg of the Redbreast. They were at least as large as Yellowhammers' eggs, but more elongated. The most curious egg was the third, which was quite different from the two others. It was very like a Chaffinch's egg, of a

greyish green ground colour, sparingly marked with smaller reddish and larger reddish brown spots, and was remarkable as being thickly spotted at the smaller end instead of the larger. It was not quite so large as a Chaffinch's egg. As I have already stated, the nest was on a patch of bare ground a foot or more in diameter, surrounded by grass and broom-bushes.

After this examination I quickly withdrew to a rather more elevated position in the underwood of the beech-forest. From this spot, with my field-glasses, which I had luckily brought with me, I could survey the ground below me quite clearly. Within six minutes the Cuckoo came back, and after flitting around for some time alighted near the nesting-place, and proceeded with a characteristic waddle on to the nest. For more than an hour and a half I kept the spot in view. During all this time the Cuckoo sat quiet on the nest, so that there could be no further doubt in my mind that it was sitting on its own eggs.

Until the 25th May I left the Cuckoo to sit undisturbed. On the morning of that day I visited the spot again, and, on the bird flying off, found, to my great joy, a young Cuckoo in the nest. Judging from my observations of young Cuckoos, it seemed to have been hatched about five or six days, for the shafts of the quills showed on the wings, traces of feathers were visible on the shoulders, and the eyes had begun to open. On one side of the nest I found the reddish brown and the small egg. The first was crushed in and appeared to be rotten; the second was uninjured, but on attempting to blow it subsequently I found that it was unfertilized, and only contained a partly dried-up and wasted yolk. No doubt, like the injured one, it was an egg dropped during the time of sitting, and not fully developed nor fecundated, as was apparent from its inferior size, very thin shell, and small contents.

In the meanwhile the sitting bird kept circling around me, flying low, at short intervals, a proof that she had great anxiety for her young one. My experiments with this young Cuckoo led me to quite a different result from that which I had previously formed from the behaviour of two others in the nest of a Redbreast. The latter were always restless, continually extending their wings over the back, and one of them occasionally thrust his head and neck so far behind him that he fell over. The bird which I was now observing, on the other hand, kept quite quiet,

with his head and neck on the bottom of the nest. He did not even stir when I touched him with my finger on the back, in which the characteristic depression found in very young Cuckoos was still discernible, nor when I placed an egg or some similar substance on his back. I concluded therefore that the sitting mother must have herself removed the addled eggs, and not the young Cuckoo, as it is wont to do when in other birds' nests.

After this I returned again to my point of observation, but did not succeed in seeing the young bird fed by the old one, as I was disturbed by some people cutting grass in the neighbourhood, and resolved to defer my further observation until a quieter day.

When I returned to the place on the morning of May 26th, I had several times an opportunity of seeing the young Cuckoo fed by the old one with what appeared to me to be green caterpillars. On the same occasion the young nestling was sat upon and warmed by the mother for a long while. When I arrived at the spot I placed myself at my former post of observation, and saw with my glasses the old bird sitting on the nest. For twenty-two minutes I watched her in this situation, when I was surprised to see her suddenly rise from the ground at several paces distant from the nest and fly away. I seized the opportunity of visiting the nest, and found the young Cuckoo lying in the hollow with its eyes nearly quite open. When I approached, it erected the front part of its body, and opened its orange-coloured mouth, uttering its fine piping cry. The space round the nest was thoroughly cleared of excrement,—a striking proof that the mother Cuckoo possesses the ordinary instinct of nest-building birds, that of removing the comparatively large fæces of the young with its bill. About three minutes after I had got back to my hiding-place I saw the old Cuckoo alight on an open spot six or eight footsteps distant from the nest, after which it fed the young with some green substance, apparently caterpillars, as I could see with my glasses, and then covered it with her body again for about a quarter of an hour. The mother left the spot on this occasion again by flying up from the neighbouring place before mentioned, and not immediately from the nest. Within a few minutes she returned with a similar lot of food, and, after feeding the young one, retired in the same way as was before described. After the second return and

feeding, the warming of the young bird was again repeated. After a good quarter of an hour in my hiding-place I left the spot without disturbing the old bird.

All through my period of observation in this part of the forest I had noticed the unusual frequency of the calls of the male Cuckoo. I counted at least six individuals challenging one another with their songs. In the higher wood close by I had listened at short intervals to the furious blows of the wing exchanged in combat by the males and to the call-notes of both sexes. I had an entertaining view of the proceedings of the amorous birds, as I passed on my way shortly afterwards. On the tops of the oaks and pines sat the excited males, with their tails carried high and their wings drooping down, repeating their usual call-notes, among which the ordinary "cuckoo" was often prolonged into "cuc-cuc-koo," and in other cases was shortly and abruptly broken off in the middle. Every now and then they dived into the branches in pursuit of the hens, which were recognizable by their paler and browner coloration. In short, this particular spot in the forest was evidently a special rendezvous of Cuckoos. In spite of the unseasonable weather this day (overcast sky and frosty wind), there was a singing and fighting going on which could hardly have been exceeded in the warmest day of May or June.

Anxious to ascertain the reason of such a concourse of Cuckoos at this spot, I dived into the surrounding wood, which was that from which I had seen the mother Cuckoo bring food for her young one. I discovered here, on a group of oaks, a large colony of caterpillars of *Tortrix viridana*, which were easily seen from a distance hanging by their silky webs, and found also many of them on the leaves. No doubt this colony was the attraction that caused the concourse of Cuckoos.

What I have stated renders it quite clear:—(1) That the Cuckoo, in exceptional circumstances, incubates and hatches one or more of its own eggs, which, in these cases, it apparently lays together in a safe place on the ground without preparing any nest. (2) That the eggs of the same Cuckoo may be very different in colour and markings. If this be so, the purely theoretical idea held in certain quarters that each hen Cuckoo lays eggs of the same colour and markings or of "one peculiar

type," which are destined to be laid in the nests of one particular species of small bird, and are nearly the same colour as those of the foster-mother, and that she only lays them in the nests of this species, falls to the ground.

QUERY—DOES THE CUCKOO INCUBATE?

By Adolf Walter.*

In June of last year the 'Gartenlaube' astonished its readers with an article headed "The Cuckoo incubates." This number of the periodical referred to was handed to me by a friend, with the words:—"Here is an important observation; the Cuckoo incubates." I returned the paper without looking at it or asking who the author of the article was, and told my informant that it was either a joke or an invention, and that the Cuckoo was, as everybody knew, unable to incubate. * * * *

I did not think of this article again until I received the July number of the 'Zoologische Garten' containing the same announcement. This caused me to give the article more attention, as its author proved to be the well-known ornithologist Adolf Müller. I was surprised, on reading it, to find that the writer still holds the opinion that the Cuckoo occasionally incubates, although it has been shown, by Dr. A. Brehm and others, that the observation made by Herr Kiessel, who thought he had seen a female Cuckoo sitting on two eggs, was unreliable, and that there was a confusion between the Cuckoo and the Nightjar (*Caprimulgus*). I was still more astonished when I had finished reading the article, which is worded in the most serious manner and with minute details of time and place. I could not but imagine that there was some mistake, for much of what the author relates, and relies upon to support his case, does not seem at all probable. In my opinion the observation can only be regarded as a delusion, and how easy it is to fall into error is only too well known.

Herr Müller says that "this time certainly no voice will be

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* For this translation from the 'Journal für Ornithologie' (Jan. 1889, pp. 33—46) we are indebted to Herr A. W. Kappel, who kindly undertook to prepare it at very short notice. For the sake of brevity, we have omitted several dispensable paragraphs.—Ed.

raised to support the convenient suggestion that the native Cuckoo has been again confounded with the Nightjar, &c." I am quite willing to concede that few ornithologists would suspect that there was any confusion with the Nightjar in this case, for the character and habits of the Cuckoo are correctly portrayed in the course of the narrative. Nevertheless none of the ornithologists with whom I have been able to discuss the matter believe in the incubation of the Cuckoo; they all consider the report to be an error of observation.

As I have paid much attention to the habits of the Cuckoo, I was asked by several distinguished ornithologists, both verbally and by letter, to publish my opinion of Herr Müller's article in a scientific Journal, and I now do so, although it is not pleasant for me to have to differ in opinion from so eminent an ornithologist. I take it for granted that the July number of the 'Zoologische Garten' is before the reader, or that he at least knows the gist of Herr Müller's observations. I therefore confine myself to recapitulating the heads of the discussion as briefly as possible.

The nest containing three eggs of different size, colour, and shape, was found on May 16th by Oberförster Müller, in his official district of Hohenschied, in a shallow depression on the ground, which was clear of grass and brambles for thirty to thirty-five centimetres. A brownish female Cuckoo had just risen close to this place. Herr Müller drew back quickly, and it reappeared after a few minutes, and alighted not far from the nest. After waiting for three-quarters of an hour, the bird, which Herr Müller assumed was about to lay its egg with the three, was again found near the nest, and now for the first time he recognised the three very different-looking eggs as the eggs of the Cuckoo, which were extremely fragile and thin-shelled. Here I beg to observe that no one can notice the thinness of the shell in an unbroken Cuckoo's egg, especially as, according to Brehm and others, Cuckoos' eggs have not got thin shells. After making this observation Herr Müller quickly retired, and observed from a place of concealment that the Cuckoo flew to the nest again after six minutes, and remained constantly sitting on the eggs during the whole time of observation, which lasted over an hour and a half.

On May 25th, after the Cuckoo had quitted the nest, a young Cuckoo, about six days old, was found in the nest, and not far

from it the two Cuckoo's eggs, a reddish brown one, and a very small one which the female Cuckoo had pushed aside. After Herr M. had repeatedly observed the Cuckoo feeding her young one with little green caterpillars at short intervals (three times in ten minutes), he found on June 10th that the young Cuckoo had left the nest, but it was still close by, and was being fed by its parent.

This shortly is the gist of Herr Müller's "personal observations." Before discussing the matter further, I must express my astonishment that Herr M. has overlooked what would have afforded a better explanation, and lent more probability to his narrative. To begin with, I may mention as a most striking fact that he did not keep the unincubated eggs and egg-shells. Most certainly several of our ornithologists—I need only mention Dr. Baldamus, Dr. Kutter, and Herr W. von Nathusius—would have been able, by examining the egg-shells, to prove whether the eggs which were pushed aside were Cuckoos' eggs or not. In such a remarkable case no naturalist would throw a fragment of an egg away. For my part I carefully preserve such specimens in my collection. I have, for example, fragments to show that the Cuckoo invariably lays similar eggs. Besides, fragments of Cuckoos' eggs are in much request for examination of the shell.

Returning to the discussion, I may observe that Herr M. is frequently in opposition with ascertained fact, and insists on untenable views. Thus he allows his Cuckoo to lay and sit on three eggs of a different colour and size, and avers in effect that one and the same Cuckoo laid them. This is not accurate; for one and the same female, as is the case with other birds, always lays similar eggs, as I am clearly able to prove. Now if all three eggs had really been Cuckoos' eggs (and they were not recognized as such by Herr M. on his discovery of the nest), they must have been laid by three different Cuckoos, which is absurd. Therefore the Cuckoo did not sit on its own eggs, or at most on only one of them. In my opinion, however, these three eggs could not have been Cuckoos' eggs at all,—certainly not the small one, as shown by its small size, its colour, and especially by its brittleness. Cuckoos' eggs are, in fact, not brittle, but uncommonly firm and hard. Who would take for an egg of the Cuckoo that which is thus described by the observer?—"The most curious egg was the third, which was quite different from

the two others. It was very like a Chaffinch's egg, of a greyish green ground colour, sparingly marked with smaller reddish and larger reddish brown spots, and was remarkable as being thickly spotted at the smaller end instead of the larger. It was not quite so large as a Chaffinch's egg."

Of the brittleness of the third and smallest egg the observer says, "On finding the young Cuckoo, the two unincubated eggs, the reddish brown one and the small one, lay by the side of the nest. The first was crushed in and appeared to be rotten, the second was uninjured, but on attempting to blow it subsequently, he found that it was unfertilized, and only contained a partly dried-up and wasted yolk. No doubt, like the injured one, it was an egg dropped during the time of sitting, and not fully developed nor fecundated, as was apparent from its inferior size, very thin shell, and small contents."

An "extremely brittle and thin shell" (as I have before remarked) is not possessed by any Cuckoo's egg, whether large or small; on the contrary, no egg of any of the foster-parents of the Cuckoo has such a hard and dense shell as that of the Cuckoo itself. If the small egg was so heavily coloured as the observer states, it must have been also fully formed, for the colour is the last stage in the development of the egg as regards the shell.

Already, in 1880, Dr. Kutter, and then Herr Hauptmann Krüger-Velthusen, simultaneously with myself, drew attention to the unusual hardness and firmness of the Cuckoo's egg (see Orn. Centralb. 1880), and subsequently I wrote, in the 9th Jahresbericht of the 'Ausschuss für die Beobachtungsstation der Vögel Deutschlands' (p. 201), concerning a Cuckoo's egg found here in Cassel in 1884, in which the beak of the young Cuckoo was to be seen through the egg. This Cuckoo's egg (which was already perforated by the embryo so that the beak of the young one was visible as a small point) was found in the accidentally destroyed nest of a Hedgesparrow, *Accentor modularis*, with four well-incubated eggs of that bird. Yet twelve days afterwards I was able to empty the egg artificially without breaking it, and it now rests in my collection as a proof of the hardness and firmness of the Cuckoo's egg. On the other hand, the much-incubated eggs of the Hedgesparrow broke on the first attempt to blow them. Not to digress too much from my task of

discussing the extraordinary observations of Herr Müller, I will very briefly mention two more instances of the remarkable strength of the Cuckoo's eggs which I think will be of interest. [Two such instances are then given, and Herr Walter continues:—] I think that I have now sufficiently demonstrated the strength of Cuckoos' eggs, but I can prove just as conclusively that one and the same Cuckoo always lays similar eggs, and consequently that the nest found by Herr Müller could not have contained the entire clutch of one Cuckoo. In proving this I am able to controvert one of the three arguments which Herr Müller uses to support his assertions.

The conclusions which he draws from his own observations are two in number. [These have been already quoted, p. 218.] My observation, however, goes further, namely (3), that the young Cuckoo—contrary to my experience of the young of this species reared by the common small birds—becomes full-fledged in about twenty-one days, whilst young Cuckoos bred in the nests of song-birds, as I have observed, take six weeks to become capable of flight. Doubtless the reason for this rapid maturing of the Cuckoo in the first case is the much abundant supply of food brought by the parent bird. [The meaning here is very obscure.]

The first conclusion of Herr Müller cannot be positively disproved, for the matter stands thus:—If he asserts that he has positively seen the Cuckoo incubating for an hour and a half on the nest, and that he afterwards saw the old Cuckoo feeding the young ones with caterpillars, a denial would be tantamount to accusing him of falsehood. We can only draw our own conclusions from what has been already stated. But as regards points 2 and 3 it can be positively shown that Herr Müller has made a mistake.

For more than ten years I have made repeated observations, and at the annual meeting of the "Allgemein Deutsche Ornithologische Gesellschaft" of Berlin, have proved by exhibition of eggs that the same female Cuckoo always lays similar eggs, so that it is almost superfluous to adduce fresh proofs, or to repeat old ones. I will therefore only refer to my own observations and those of an enthusiastic naturalist, Herr K. Ochs, of Cassel, and allow him to speak for himself.

Herr K. Ochs has made some interesting observations on Cuckoos' eggs, and knows the Cuckoos of the Habichtwald (the

locality of his observations, where he is a landowner) almost as well as he does the Canaries and Goldfinches of his aviary. He knows exactly whether his old friends have returned or not, and whether a new hen Cuckoo has taken the place of an old one that has died. He knows the old females which have returned, partly by their colouring, but more particularly by their eggs, which have always the same marking for the same female, but which vary much from those of other females—each female always returning to the same restricted locality.

As I did not find him at home when I called to talk over the matter with him, Herr Ochs wrote me a letter, which I copy exactly. It runs as follows:—"In consequence of observations made for thirty years on the Cuckoos occurring here annually, I have come to the conclusion, after finding more than 100 eggs, mostly laid in the nest of the Robin, that (1) a Cuckoo returns every year to its chosen haunts; (2) that the eggs of a particular bird remain the same in form, colour, and size; so that the eggs of a new-comer to the locality may be distinguished from those of other Cuckoos by anyone who understands the subject."

[Herr Walter then refers to certain statements of his own made in 1876, at the first annual meeting of the "Allgemein Deutsche Ornithologische Gesellschaft" (Bericht, Allg. Deutsch. Orn. Gesel. i. pp. 17, 34), and to other remarks of his printed in the 'Monatschrift des Deutschen Vereins zum Schutze der Vogelwelt' (1883, p. 36), to show that every female Cuckoo (1) always lays similar eggs, (2) always seeks the nest of the same species of foster-parent, and (3) always returns to the same locality; and he adds that after six years further study he is still of the same opinion. The lengthy paragraphs which follow are chiefly amplifications of former statements, and need not be here repeated.]

He thus concludes:—With regard to Herr Kiessel's statement I consider it, for many reasons, best to be silent. A. Brehm has already said enough about it. Moreover, Kiessel appears to have been unacquainted with the young of the Cuckoo, for he says in a letter to Herr A. Müller—"The young Cuckoo, when only just hatched, had dark down (*dunkelen Flaum*) on several places, especially on the head and shoulders, like all young birds." But the young Cuckoo when just emerged from the egg, as Herr Müller has correctly remarked, has no down, and is perfectly

white, or rather of a very pale flesh-colour; but even in the course of the second day the back of the head becomes grey, and this grey becomes darker on the following day, and continues to extend.

NOTES AND QUERIES.

Prof. Weismann's Essays on Heredity.—In response to the interest aroused by this subject, a collection of these essays has been translated under the care of Mr. E. B. Poulton, of Oxford. The volume is nearly ready, and will be published by the Clarendon Press.

MAMMALIA.

Threatened Extinction of the Kangaroo.—That there is an extreme likelihood that, unless preventive measures be taken, the Kangaroo will, in the course of a few years, have become a curiosity in its native country, is a statement which will probably be read with some amount of surprise, and perchance incredulity, by naturalists in England. That this assertion is, however, based on fact is proved, not only by the testimony of Australian naturalists, but also by American tanners, who find that, owing to the high prices now obtainable for the skins, large quantities of small unsaleable hides are forced upon the market—a course of action which they are beginning to recognise must inevitably result in the extermination, within a comparatively short period, of the Kangaroo. The following extract from a letter which I have recently received—in my capacity as secretary to the committee now seeking to secure better protection for the native fauna and flora of South Australia—from Mr. R. G. Salomon, one of the largest tanners in the United States, with respect to the desired prohibition of the sale in our colony of Kangaroo-skins under 1 lb. in weight may be of interest:—"I beg leave to say that it is of the greatest importance, not only to South Australia but also to Victoria and to Western Australia, that immediate steps be taken to stop the killing of small Kangaroos, or the total extermination of this animal will be brought about. It would surely be better to stop the killing of the young animals entirely in every part of Australia, by enacting a law which would impose a fine for the killing of any Kangaroos whose skins weigh less than ten-twelfths of a pound. Lighter skins than these are almost unsaleable, and yet there are very large quantities of such forced upon the market. The Kangaroo-skin is mainly used in the United States, and almost all those that are sold to England are resold to consumers in this country. As stated, I am deeply interested in the passing of this law; and shall, on the other hand, do everything possible to induce every tanner in this country to agree not to buy any skins not in conformity with

your restrictions. I think that the strictest co-operation can be established by which we shall succeed in the conservation of the trade, and make it a lasting one. Otherwise this will be absolutely destroyed, for in a few years the Kangaroo will be exterminated." We are now seeking to secure the enforcement of this restriction throughout Australia and Tasmania, and also, at the suggestion of Mr. Salomon, to have a close season declared between January 1st and May 1st; for eighty per cent. of the skins that are obtained in the period covered by these four months are totally ruined, being sunburnt while drying. We shall likewise endeavour to secure total protection in our own colony for the Rock Wallaby, for Kangaroos under three years of age, and for Wallabies (other than the Rock Wallaby) under two years of age. What success we shall have time will show.—A. F. Robin ('Advertiser' Office, Adelaide, South Australia).

Daubenton's Bat not in Norfolk.—In the article on this species which appeared in the last number of 'The Zoologist,' it is stated (p. 163) that "at Easton, in Norfolk, it has been noted by Mr. Gurney." This, it appears, is a mistake, the bat found at Easton being the Barbastelle. The error arose in consequence of Bell having applied the same specific name to both species, *Vespertilio daubentonii* and *Barbastellus daubentonii*. According to the latest authority (Dobson, 'Catalogue of the Chiroptera'), the Barbastelle should be known as *Synotus barbastellus* (Schreber).—J. E. Harting.

Squirrel breeding in a Church-tower.—While looking about our church-tower one day last month, I was surprised to see a Squirrel run out of one of the loop-holes, and on examining the nest I found three young ones. The Squirrel's nursery has for its foundation an old Sparrow's nest, to which a large quantity of fine dry grass has been added. The choice of the tower for a nesting-place seems the more singular, as an extensive plantation of lofty trees joins the churchyard. In another loop-hole close to the Squirrel's a pair of Kestrels (no doubt those mentioned by me in 'The Zoologist' for 1888, pp. 269, 303) have laid their eggs, and I hope the young ones may be safely reared.—Julian G. Tuck (Tostock Rectory, Suffolk).

BIRDS.

Kite and Raven nesting in South Wales.—Within the last two years the Kite and Raven have nested in Brecon. Omitting the exact localities, I may state that both nests were within six miles of the town of Brecon. In the spring of 1887, having seen a pair of Kites soaring over an extensive oak-wood on a steep hill-side, I went, with a friend who is well acquainted with the appearance of the Kite, to try and find their nest. On nearing the place we saw the Kites soaring over the wood, and found their nest without much delay. It was well placed for security, at a height of

about forty-five feet from the ground, on a slim, nearly branchless oak, which at that point divided into three limbs. By climbing another tree, higher up on the slope, we could see three young birds in the nest; they looked about ten days old, and were of a yellowish white colour. The nest was very much like a Crow's, but much larger, and was remarkable in having many loose sticks hanging from its sides. The Raven's nest was placed in an ash tree growing horizontally from the side of a precipitous ravine on a slope of the Brecon Beacons. An aneroid gave fifteen hundred feet as the height above the sea. I went to the nest, which I believe is two years old, on March 22nd of this year, and found it much the same as it was last summer. I went again on April 15th, and noticed the nest had been added to, and re-lined with white wool, and contained three eggs of the light blue variety, and one young bird. The inside of the nest could be well seen from another tree higher up on the cliff. The next day another young bird had appeared, and with difficulty I secured an egg, which proved to be addled. While I was there the two Ravens were in close attendance, soaring overhead, and sometimes perching on the rocks, and one returned to the nest very soon after I left it. The latter is a very large structure, nearly three feet high. It would seem that in twenty-five days the nest had been repaired, four eggs laid, and incubation all but completed.—E. A. Swainson, Capt. (Woodlands, Brecon).

[We sincerely trust that the naturalists of Brecon will do all in their power to protect these fine birds.—Ed.]

Sand Grouse in Germany.—In a long article extending over thirty-three pages, Dr. Reichenow, in the 'Journal für Ornithologie' for January last, has traced the occurrence of this species in Germany during the year 1888, mentioning all the localities in which, so far as he could ascertain, it had been observed.

Sand Grouse in Middlesex.—As I have not seen any notice in print of the appearance of Pallas's Sand Grouse in Middlesex during the recent immigration of this species, it may be well to record that a little flock of about a dozen birds were seen in this neighbourhood, near Staines Moor, on June 19th, 1888. They were observed at close quarters by a neighbour of mine, who, on seeing in my collection the stuffed specimens which I had procured during the former invasion of this species in 1863, had no hesitation in identifying the species. So far as I know they were not molested, and I am glad to say that no one about here carries a gun in the summer time.—F. Bond (Staines, May 20).

Sand Grouse in Surrey.—The following notice of the occurrence of Pallas's Sand Grouse in Surrey is taken from the 'Graphic' of March 2nd last:—"Pallas's Sand Grouse, which was very plentiful last year, still lingers. A specimen was shot by mistake for a Dove, at Shirley, near

Croydon, the last week of February."—Ernest Salmon (Clevelands, Wray Park, Reigate).

Sand Grouse in Glamorganshire.—This is an additional species to the Glamorganshire list. Mr. J. T. D. Llewelyn, of Penllergare, tells me that about this time last year, when the Sand Grouse were occurring so frequently all over these islands, a flock of sixteen appeared at Llanrhidian, in Gower, and two were shot (a male and a female) by Mr. S. Davies, of Llanrhidian Farm. The birds remained there only about a week. The two that were shot were stuffed, and may now be seen in the possession of Messrs. H. M. and C. E. Peel, in Swansea. Mr. O. H. Jones, of Fonmon Castle, near Cowbridge, has also written to tell me that a pair of Sand Grouse appeared last year, in the spring, on a farm about three miles from where he lives, and are said to have bred there. The farmer states that he saw them with young ones, but Mr. Jones thinks that there is very considerable doubt as to their having bred.—Digby S. W. Nicholl (The Ham, Cowbridge).

The Firecrest in Cumberland.—As my friend Mr. J. H. Gurney, jun., has taken exception (p. 174) to the record of *Regulus ignicapillus* from Cumberland, on the ground that the specimen is not now forthcoming, I think it right to say that the person who killed the bird is forthcoming, and that he is, and always has been, certain that his bird was a Firecrest, basing his opinion on Yarrell's description. This person (Mr. Graham, of Carlisle,) has a good knowledge of the rarer British birds. He has always stated that he gave the bird to a certain birdstuffer formerly well known in Carlisle. This man—by name Baily—latterly formed a collection of his own; but at the time that the Firecrest was killed he usually disposed of his specimens. Whether this specimen went to Mr. Heysham or not, is not at present known, scarcely any of his letters referring to that period. But we do know that some of Mr. Heysham's best specimens were destroyed by moth, and this specimen may have been among them. At all events, Mr. Graham adheres to his statement that the bird was a Firecrest; and he himself, when first giving the information in writing, correctly described the distinctive points between the Firecrest and the Goldcrest.—H. A. Macpherson (Carlisle).

Blue-winged Teal in Cambridgeshire.—On April 24th Mr. L. Travis, the Bury birdstuffer, showed me a duck he had just set up, which had been sent to him in the flesh a few days before from March, in Cambridgeshire with a male Shoveller. A reference to Mr. Saunders' 'Illustrated Manual of British Birds' (p. 422) enabled us to identify it as a mature male Blue-winged Teal, *Querquedula discors*. It has the broad white streak in front of the eye, the brilliant blue wing-coverts, and legs like those of the Shoveller. In answer to enquiries Mr. Travis kindly made

for me, he was informed it was killed near March. I had hopes of being able to trace it to Norfolk.—Julian G. Tuck (Tostock Rectory, Suffolk).

Crossbill Breeding in Immature Plumage. — I read with much pleasure Mr. Ussher's notes (p. 180) upon the Crossbill breeding in Co. Waterford, and the more so as Dr. Günther had kindly shown me the birds referred to, a few days before. The interesting point, of course, is to find the male of *Loxia curvirostra* breeding in a yellow dress, and before assuming the red plumage of maturity. Your readers will recollect that Mr. A. C. Chapman found the Pine Grosbeak breeding in immature plumage in the Tana valley, and Mr. Seebohm states that *Carpodacus erythrinus* does the same. I may add that the Lesser Redpoll also breeds in immature plumage, *i.e.*, before the male has acquired the rose-pink breast, which Professor Newton describes as the summer plumage of that species. Among the *Falconidæ* the male Hen Harrier has been proved more than once to breed in immature plumage; and if attention were paid to this point, probably similar facts would be elicited in regard to other species.—H. A. Macpherson (Carlisle).

Crossbills Nesting in Suffolk and Norfolk. — I have just received (April 11th) through Mr. Marsden of Gloucester, two nests of Crossbills, five eggs in each, and one hen bird shot from the nest; the one taken at Wrangford, in Suffolk, on April 4th, the other at Westing, in Norfolk, on March 30th. Perhaps they are of sufficient rarity breeding so far south as to be worth recording in 'The Zoologist.'—Philip Crowley (Waddon House, Croydon).

[The nest of the Crossbill has been found very much further south than Mr. Crowley supposes, as, for example, in Hampshire, at Bournemouth, and in the Holt Forest. In this forest, before the Scotch firs were cut down (in 1838) to allow more room for the growth of the young oaks, Crossbills commonly bred there; and when the fir trees were thrown in the year referred to, four nests and eggs of this species were found amongst the branches, as recorded by Mr. Lewcock, of Farnham, Zool. 1843, p. 189.—Ed.]

Bee-eater in Ireland. — On the 2nd May last a male Bee-eater (*Merops apiaster*) was shot at Ballbriggan, Co. Dublin, in beautiful plumage, and in good condition. The stomach contained the remains of bees.—Edward Williams (2, Dame Street, Dublin).

[What a pity it is that these beautiful birds cannot be left unmolested on their arrival, and that one selfish individual should invariably deprive all the naturalists in his county of the pleasure of observing it. We fail to see the use of a "Wild Birds Protection Act," obtained with so much trouble, if those who profess to be ornithologists do not aid in getting it enforced.—Ed.]

The Attitude of Grebes on Land.—The attitudes of diving birds when on land are so little known that I make no apology for troubling you with a brief observation on the subject. Yarrell states that Grebes "sit upright on the whole length of the tarsus." This is illustrated by his figures of the Eared and Sclavonian Grebes, which are represented as resting like any of the *Alcidæ* on the tarsus. On May 4th my cousin and I closely examined a Great Crested Grebe, *Podiceps cristatus*, at the fish-house in the Zoological Gardens, Regent's Park. We found that the bird sat up naturally enough, not with the tarsus resting on and parallel with the ground, but raised at an angle of about 22½°. It is clear, therefore, that Yarrell had in his thoughts the *Alcidæ*, and that he was mistaken in ascribing their action to the Grebes.—H. A. Macpherson (Carlisle).

Late Stay of Bramblings in Suffolk.—Bramblings have remained in Suffolk later than usual this year. On April 17th a fine male, which looked very dark in colour, was feeding under some beech-trees near the house. A week later there were two male Bramblings in the flesh in a shop in Bury; one was in ordinary winter dress, but the other had the head almost black, and differed from any other which has ever come under my notice, in having the part of the back which is usually white, of a bright canary yellow. This curious variety is now in my collection. On April 25th my gardener, who is a very keen-sighted observer, saw a pair here.—Julian G. Tuck (Tostock Rectory, Suffolk).

Audacity of Jackdaws.—Jackdaws abound here in the old trees, and have become so mischievous, destroying all the Blackbirds', Thrushes', and other eggs (to say nothing of game) that, rather reluctantly, I ordered their numbers to be reduced. The next day, or nearly so, my shepherd saw a Jackdaw plunder a Kestrel's nest near the house, that I have each year tried to protect, and take the eggs. The bird dropped one, and in order to identify it, I directed the man to bring me the broken egg-shell, which he did; and I found it to be a Kestrel's. This attack on a hawk's nest, although the Kestrel is not a bold bird, still shows a Jackdaw's audacity to be considerable.—W. Oxenden Hammond (St. Alban's Court, near Wingham, Kent).

Jackdaws Nesting in old Magpies' Nests.—In some small plantations near here Jackdaws have lately taken to occupying the Magpies' nests. In May, 1887, I found in these plantations four newly-built nests of the Magpie, but from one of these the Magpies had been ejected by a pair of Jackdaws before they had completed their nest; the Jackdaws had lined the nest and laid eggs therein. In 1888 I did not visit these woods. On May 7th of the present year I found there were six old nests of the Magpie, each tenanted by a pair of Jackdaws, and one pair of Magpies had built a new nest, and up to that time kept possession of it for themselves.

The nests are situate at the top of tall Scotch and larch fir-trees, and have been plentifully lined by the Jackdaws with sheep's wool and other materials. I believe Jackdaws are very rarely found nesting on the open boughs of a tree, and that they have never been known to actually build for themselves in such a situation. Is any correspondent of 'The Zoologist' aware of any such instance? In the present case, when the Jackdaws have succeeded in driving all the Magpies away, they will either have to build for themselves or else change their quarters.—E. W. H. Blagg (Cheadle, Staffordshire).

[Several instances of Jackdaws building nests in trees will be found recorded in 'The Field' of May 22, 1875, and 'The Zoologist,' pp. 185, 823, 9572.—Ed.]

Eggs of the Grey Wagtail.—On May 11th, I found five eggs of the Grey Wagtail, very different from the ordinary form of the eggs of this species, which is, I should say, an egg with a yellowish underground, thickly covered with rather darker markings. The eggs in question have the underground quite white, and are spotted with grey, very much like eggs of the Pied Wagtail. Has this variety been found before? I have never seen such eggs, nor can I find mention of them in any works on Natural History I have consulted.—E. W. H. Blagg (Cheadle, Staffordshire).

[The question naturally suggests itself, "Are they eggs of the Grey Wagtail?" Our correspondent does not state that the birds were seen at the nest, or offer any evidence of correct identification.—Ed.]

Early Nesting of the Little Grebe in Co. Dublin.—On the 2nd April I discovered a nest of the Little Grebe, *Podiceps minor*, containing five eggs. It would seem therefore that some of these eggs must have been laid at the end of March. Is not this a very early date for the nesting of this bird? Mr. Miller Christy, in his little book on 'Birds-nesting,' gives the time of nesting of this bird as from May to July. One of the eggs was accidentally broken by me, but I have the remaining four, and there can be no doubt as to the identity of the species. The nest was in the usual situation on the outskirt of some reeds, floating and almost level with the surface of the water, and was thoroughly soaked, the eggs lying in the wet interior. Contrary, however, to my usual experience with the nest of this bird, the eggs were wholly uncovered, and are consequently much cleaner than the generality of the eggs of this bird which I have seen.—J. J. Dowling (1, Fingal Terrace, Howth Road, Clontarf).

Ornithological Notes from Lowestoft.—The following notes were made last year at Herringfleet Hall, near Lowestoft Several Ring Ouzels in immature plumage were observed about the hedges and on the common in the middle of September, and up to about October 8th, after which date they disappeared. Mr. Pyecraft, a birdstuffer in Yarmouth,

informed me that an Osprey was shot on Fritton Lake during the second week in September. A Jack Snipe was shot by Mr. L. Peto, on September 25th near here, and I shot one myself on the marshes near St. Olave's Station, on September 26th, a somewhat early date for their appearance. On October 17th, while Snipe shooting on the "rands" near St. Olave's Station, my retriever caught a Spotted Crake, and brought it to me alive. It was a good specimen, a hen bird, and remarkably fat. I flushed two others on the same ground the same day. I flushed a Short-eared Owl out of some long grass while snipe-shooting in the marshes near St. Olave's Station, October 27th. I observed a Buzzard, apparently the Common Buzzard, in the woods surrounding the Fritton Lake, daily from about August 4th to the 16th, after which it took its departure. About May 29th, Mr. Bunn, birdstuffer, Lowestoft, received for preservation a female Sand Grouse that was picked up dead on the shore near the town; the ovaries were not at all developed. On May 30th, Mr. Sheals, birdstuffer, Belfast, received one that was killed at Killough, Co. Down. On May 31st, Mr. James Sutton wrote me that two Sand Grouse, also females, killed by the telegraph wires, were in the hands of the Sub-curator at Durham. A beautiful specimen of another hen bird that was shot at Blundeston, near Lowestoft, is now in my possession. A nest of the Shieldrake, containing fresh eggs, was taken by a friend of mine on the sandhills near Burnham, Somersetshire, August 23rd, which seems to be an unusually late date at which to find fresh eggs. A Snow Bunting was killed at Cromer on October 29th. In a letter received by me from Mr. W. E. Baker, dated Tilney, All Saint's, Norfolk, October 29th, 1888, he says:—"I think there must have been an unusual number of Hawfinches this year with us, as I found six nests containing eggs and young in one day. The Sand Grouse have not yet left Norfolk, as I saw a fine pair at one of our local birdstuffers last week, in full plumage and in splendid condition, as also a Ring Ouzel."—E. A. Butler, Lieut.-Col. (Herringfleet Hall, near Lowestoft).

Kestrel's Nest on a Wheat-stack.—A pair of Kestrels have layed in a wheat-stack this year as they did last year, and on the same farm, so probably they are the same birds. Two eggs were found, while the stack (one of four) was being thrashed, about the beginning of May. The stacks were by the road-side, about 300 yards from the farm buildings. I am glad to say that the Kestrels on this farm are not molested, except by such an accident as thrashing the stacks, in which they seem so fond of laying their eggs. About 400 rats and six weasels were killed in these four stacks, and it seems wonderful, therefore, that the hawks' eggs were not eaten by them.—George E. Lodge (5, Verulam Buildings, Gray's Inn).

Strange Capture of a Golden Eagle.—During the last week of April, as Mr. Alexander Shaw, farmer, Oldtown, Stratherrick, on the estate of

Captain Fraser of Farraline, was going round among his sheep stock about four o'clock in the afternoon, he came on two Golden Eagles near the edge of a birch wood. They were lying on their sides, and at first sight Mr. Shaw thought they had been trapped, but on closer examination he found they were engaged in a desperate combat with each other, and had got their talons so closely locked together that he approached and placed his feet on them, and, holding one of the birds by the wings, managed to secure it. He made an effort to retain the second bird, but it ultimately made its escape. Mr. Shaw stuck gallantly to the one bird, and, holding it firmly by the wings, forced it in front of him to the nearest farm-house, where he threw a bag over its head, and made it captive. Strange to say, Mr. Shaw escaped without the slightest injury, although the bird frequently struck at him. Hearing of the peculiar capture, I purchased it from Mr. Shaw, and sent it to the Zoological Gardens, Regent's Park, London. When despatched, the bird was quite lively, fully grown, and in excellent plumage.—Thomas G. Henderson (Inverness).

Weight of Woodcocks.—Having seen a letter of Mr. Harcourt's in 'The Zoologist' of April last about the weight of two Woodcocks shot by his gamekeeper, it may interest him to know that on the 29th October last I shot one in this neighbourhood that weighed just over 1 lb. The softness of the ground cannot have had much to do with the size of this one, it being before the time of much frost. I have killed a good number of Woodcock at different times, over 100 one season in the west of Scotland, but this is the largest I remember. I regret that I did not verify the sex.—F. P. Johnson (Castlesteads, Brampton, Cumberland).

Woodcocks.—The following notes on Woodcocks in Ireland may be of interest to Mr. E. W. Harcourt:—In the south of Wexford, Woodcocks have been more scarce than usual this year, and in 1888 also they were scarce. They never visit this part of the county in large numbers, but are more frequent in the north, where some breed, I believe yearly. The best bag on record in the north of this county (at Wilton) in one day was sixteen and a half couple; in 1887 thirty-five cocks were killed in two days; in 1886 nineteen in one day, but I am told there must have been seventy birds seen. I heard that in Meath cocks were a little scarce, and this appears to apply to Waterford also.—G. Barrett-Hamilton (Kilmanock House, New Ross, Co. Wexford).

Cirl Bunting in Glamorganshire.—For the last few weeks, so Mr. W. Allen tells me, a pair of Cirl Buntings have come regularly to pick up crumbs and corn in front of the windows of the Rectory at Porthkerry. He thinks that they intend building close by. Mr. Allen sent a notice of the occurrence to 'The Field,' which appeared in the issue of May 4th.—Digby S. W. Nicholl (The Ham, Cowbridge).

Golden Oriole in Kent.—On April 21st I saw in Westerham Park, Kent, a male specimen of *Oriolus galbula* feeding in company with two or three Thrushes. I watched it for nearly half an hour, hoping to see a female Oriole, but failed to detect one. I have abstained from recording this rare visitant, trusting to give it a chance of life, until it had overcome the fatigue of migration.—JOHN T. CARRINGTON.

The Great Grey Shrike in Holderness.—This somewhat local bird was met with last April at Arram Hall, near Hornsea, the residence of Mr. Thomas Bainton. It visits us, though sparingly, towards the end of autumn, returning to the north of Europe for the breeding season.—PETER INCHBALD (Hornsea, near Hull.)

Bittern in Devonshire.—On January 15th a Bittern, *Botaurus stellaris*, was shot in the parish of Bickington, about eight miles from Barnstaple, and was taken to Mr. Rowe, the taxidermist, of this town, at whose shop I had an opportunity of inspecting it.—J. G. HAMLING (The Close, Barnstaple).

Kite in Suffolk.—A male Kite was taken at Eriswell, in Suffolk, on November 16th last. This is the same bird which is referred to last December in two issues of 'The Field,' under the heading of "The Kite in Norfolk."—JULIAN TUCK (Tostock Rectory, Suffolk).

Little Gull in Cornwall.—On February 21st, whilst out on the sand-flats between Hayle and St. Ives, a friend of mine observed two specimens of the Little Gull (*Larus minutus*), one of which he was fortunate in shooting for me, a good specimen of a young bird.—F. STANSELL (Staplegrove, Taunton).

REPTILES.

Lizard swallowed and rejected alive by a Viper.—Mr. R. H. Ramsbotham, Waterside, Todmorden, has sent to the British Museum, for examination, a Viper and a Lizard in spirit, with the following remarks:—"This adder was caught at Trowbers Warren, Sussex, on April 24th, 1889, about noon. It was kept in this bottle without spirit till the following morning, between 9 and 10, when the bottle was filled. Immediately after this was done, the Lizard (which is still in the bottle, and has not been touched) crawled out of the snake's mouth, and was quite lively for a short time." We have thus in this observation three facts well worthy of record:—(1) That Vipers do occasionally swallow Lizards, although their food normally consists of small rodents. (2) That in this instance the snake did not avail itself of its poison-apparatus in seizing its prey. (3) That a Lizard retained life for nearly twenty-four hours in the gullet of a Viper. The Lizard is an adult female *Lacerta vivipara*.—G. A. BOULENGER (Natural History Museum, Cromwell Road).

MOLLUSCA.

Limnæa involuta probably a Variety of L. peregra.—The question broached by Mr. More (pp. 154 and 155 *ante*), as to what is now known as *L. involuta* being merely a variety of *L. peregra*, I may point out, is not new. Adams, on p. 35 of his 'Collector's Manual of British Shells' (1884), broaches the question, but, without giving any reasons, simply remarks, "It is probably a variety of *Limnæa peregra*." I would like to ask Mr. More on what physiological or other grounds is it conceivable that the scanty supply of lime-salts and of food-stuff in the Lough could produce an *involuted* spire? If the smallness of the mountain tarn and the isolation of *involuta* have anything to do with its conversion into that form from *L. peregra*, then I would point out that there seems to me here a contradiction. I presume that for the sake of the exactness of experiment Mr. Waller kept the *involuta* Mr. More sent him isolated, and also I presume the tank—or whatever he used—was somewhat smaller in its capacity than Lough Crincaum. Then, taking the supposition that these two conditions obtained in Mr. Waller's experiment, and taking also the supposition that the isolation and the smallness of the mountain tarn may have produced, or have helped to produce, the conversion of *L. peregra* into *L. involuta*, we have the anomaly of similar causes producing two diametrically opposite effects—in one case the conversion of *L. peregra* into *L. involuta*, in the other the reversion of *L. involuta* into *L. peregra*. In this, I consider, lies the futility of the evidence advanced by Mr. More in favour of the theory he promulgates. Again, supposing that the scarcity of lime-salts and of food-stuffs in the Lough may have produced, or have helped to produce, the conversion of *L. peregra* into *L. involuta*, I may point out that there exists a thin and small variety of *L. stagnalis* (called var. *fragilis* by Jeffreys) which may be as legitimately considered to be produced by the scarcity of lime-salts and of food-stuffs in the medium in which it lives, yet it does not possess an involuted spire. Against this supposition, however, I would point out a statement for which Prof. Rolleston and Mr. W. Hatchett Jackson ('Forms of Animal Life,' 1888, p. 127) are answerable:—"The thickness of a shell does not depend upon the amount of lime in the waters in which the animal dwells, but rather on the workings of its tissues, modified by surrounding influences, whether chemical or non-chemical. This may be readily seen by a comparison of the dense shell of a Pearl Mussel, *Unio margaritifer*, from the mountain-streams of Westmoreland, with the thin shell of *Anodonta* from Oxford waters, much richer in lime." And even if here these authors are speaking specially of the Lamellibranch shell, yet there is no reason why it should not equally apply to the shell of a Basommatophor. The very fact that Mr. Waller fed his *involuta* upon water-cress lends a decided assumption to a belief that he accidentally

included a nidamental mass of *L. peregra* (or even a few detached eggs of this species, which would be easily overlooked) among the food introduced. And if *L. involuta* is merely a variety of *L. peregra*, then I should be inclined to suppose that reversions to ancestral conditions would be found in the Lough. It would be interesting to know whether *L. involuta* differs in its internal anatomy from *L. peregra*, for this would settle at once their specific distinctness or the reverse, and if I could obtain any live specimens of the former I would be willing to examine them in this relation; the fact that the contour, &c., of their bodies, when externally examined, are alike, experience has taught me to regard as of very little weight for diagnostic purposes. So far, taking into account what I have stated above, with the almost alpine distribution of *L. involuta* and the differences in the shell between it and *L. peregra*, I must still maintain the opinion I have long held of the specific distinctness of *L. involuta* from *L. peregra*.—J. W. Williams (Mitton, Stourport, Worcestershire).

Testacella haliotidea (var. scutulum) in Renfrewshire.—More than six years ago I requested a gardener of my acquaintance to pick up for the Paisley Free Museum as many varieties of slugs as he could find. He promised to do so, and it was not long before he gave me several, among which was one of *Testacella haliotidea*, which I recognised from the figures in Jeffrey's, Forbes and Hanley's, and Dr. Gray's works. I desired him to procure for me, if possible, a few more. In a short time I had twelve from him. These I kept for some months alive, but as we were busy getting up a large addition to our Museum, they were neglected and died, but the shells were saved for the Museum. The throng being over and the place well filled, I desired to procure specimens to preserve in spirits; for this purpose, in January, 1889, I spoke to another gardener, and showed him figures of the slugs. Soon he sent me sixteen fine specimens; these I had the pleasure of exhibiting alive at one of our monthly Natural History meetings. I have preserved in spirits a few of the most marked specimens, as well as their eggs; and, thinking that I might again lose the species, I have allowed the remainder to get loose in a garden near at hand.—Morris Young (Curator, Paisley Free Museum).

CRUSTACEA.

Athanas nitescens in Ireland.—I do not think that this pretty little crustacean, so like a miniature lobster, has yet been recorded as Irish. In 1869, when collecting for the Royal Dublin Society, in the West of Ireland, I captured this rare species, in a rock-pool, on the small island of Magdara, which is noted also for a very interesting old chapel ruin. It lies a short distance to the south of Roundstone, Connemara.—A. G. More (74, Leinster Road, Dublin).

SCIENTIFIC SOCIETIES.

Linnean Society of London.

May 2, 1889.—Mr. C. B. Clarke, M.A., F.R.S., in the chair.

Messrs. H. B. Hewetson (of Leeds), M. B. Slater and T. W. Shore were admitted Fellows of the Society; and Messrs. C. Hedley, T. W. Girdlestone, and E. E. Prince were elected. Prof. W. Pfeffer, of the University of Tubingen, was elected a Foreign Member.

With reference to a recent exhibition, by Mr. D. Morris, of leaves of different species or varieties of plants included under *Erythroxylon Coca*, Lamarck, Mr. Thomas Christy made some remarks on the leaves of a variety from Japan. These he described as brittle and thin, with hardly any trace of cocaine, though yielding 8 per cent. of crystallizable substance. The thicker leaves of the Peruvian plant yielded more cocaine, though at first rejected on account of their more glutinous nature.

Mr. John Carruthers read a short paper on the cystocarps, hitherto undescribed, of a well-known sea-weed, *Rhodymenia palmata*, upon which remarks were made by Mr. G. Murray and Mr. A. W. Bennett.

The second part of a monograph of the *Thelephoreæ* was communicated by Mr. G. Massee.

Mr. Mitten contributed a paper on all the known species of *Musci* and *Hepaticæ* recorded from Japan. An interesting discussion followed on the character of the Japanese Flora, in which Mr. J. G. Baker, Dr. Braithwaite, and Mr. G. Murray took part.

The meeting adjourned to May 24th.

Zoological Society of London.

April 16, 1889.—Dr. A. Günther, F.R.S., Vice-President, in the chair.

The Secretary exhibited a pair of a fine large Buprestine Beetle of the genus *Julodis* (*J. Ffinchi*), obtained by Mr. B. T. Ffinch near Karachi; and a Mole-cricket, *Gryllotalpa vulgaris*, sent by Mrs. Talbot from Bagdad.

Mr. Sclater made some remarks on the animals he had noticed during a recent visit to the Zoological Gardens of Rotterdam, Amsterdam, and Antwerp.

A communication was read from Mr. A. H. Everett, containing remarks on the zoo-geographical relationships of the Island of Palawan and some adjacent islands. In this paper it was contended that Palawan and the

other islands intervening between Borneo and Mindoro form an integral portion of the Bornean group, and do not naturally belong to the Philippine Archipelago, with which they have hitherto been treated. The writer founded his contention upon the grounds (1) that the islands in question are connected with Borneo by a shallow submarine bank, while they are separated from the Philippines by a sea of over 500 feet depth; and (2) that a comparison of the Bornean and Philippine elements in the fauna of Palawan, so far as it is known, shows a marked preponderance of the former over the latter element; while the Philippine forms are also more largely and more profoundly modified than the Bornean species. This fact indicated that they had been longer isolated, and consequently that the fauna of Palawan was originally derived from Borneo, and not from the Philippines, though a considerable subsequent invasion of species from the latter group had taken place.

A communication was read from Mr. Oldfield Thomas, containing an account of the mammals of Kina Balu, North Borneo, from the collections made on that mountain by Mr. John Whitehead in 1887 and 1888. The species represented in Mr. Whitehead's collection were twenty-one in number, of which six had proved to be new to science.

Mr. G. A. Boulenger read the second of his communications on the fishes obtained by Surgeon-Major A. S. G. Jayaker at Muscat, on the east coast of Arabia. The two collections recently received from Mr. Jayaker contained examples of eighty species not included in Mr. Boulenger's former list.

May 7, 1889.—Prof. Flower, C.B., LL.D., F.R.S., President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of April, and called attention to a young male Sinaitic Ibex, *Capra sinaitica*, from Mount Sinai, presented by Sir James Anderson; and to a young male of the Lesser Koodoo, *Strepsiceros imberbis*, from East Africa, presented by Mr. George S. Mackenzie.

Mr. Sclater exhibited and made remarks on a living specimen of an albino variety of the Cape Mole, *Georychus capensis*, lately presented to the Menagerie by the Rev. George H. R. Fisk.

The Secretary read a letter addressed to him by Dr. E. C. Stirling, of Adelaide, containing a copy of his description of a new Australian burrowing Mammal, lately published in the 'Transactions of the Royal Society of South Australia,' and promising to send to the Zoological Society a more complete account of the same animal.

Mr. Seebohm exhibited and made remarks on the skin of a male example of *Phasianus chrysomelas*, which had been transmitted in a frozen state from the Trans-Caspian Provinces of Russia.

A communication was read from Col. C. Swinhoe, containing descriptions of seventy-five new species of Indian Lepidoptera, chiefly Heterocera.

A communication was read from Rev. O. P. Cambridge, containing the description of a new Tree Trap-door Spider from Brazil, proposed to be called *Dendricon rostratrum*.

Mr. F. E. Beddard read some notes on the anatomy of an American Tapir, *Tapirus terrestris*, based on a specimen lately living in the Society's collection.

A communication was read from Prof. Bardeleben, of Jena, on the præpollex and præhallux of the Mammalian skeleton. The author recorded the presence of a two-segmented nail-clad præpollex in *Pedetes*, and that of a two-segmented pisiform (post-minimus) præhallux in *Bathyergus*. He also stated that he had discovered vestiges of the præhallux and præpollex in certain Reptilia. He then passed to the consideration of the Mesozoic *Theriodesmus* of Seeley, and denied the existence of the *scapho-lunare* of that author, while he produced good reason for believing the same observer's second *centrale* to consist of two elements, and his præaxial *centrale* to be the basal element of a præhallux.

Mr. Oldfield Thomas read the description of a new genus and species of *Muridæ* from Queensland, allied to *Hydromys*, which he proposed to call *Xeromys myoides*.—P. L. Sclater, *Secretary*.

Entomological Society of London.

May 1, 1889.—Mr. Frederick Du Cane Godman, M.A., F.R.S., Vice-President, in the chair.

Mr. Walter F. H. Blandford, B.A., and Mr. John W. Downing, were elected Fellows; and Dr. Neville Manders and Mr. Arthur Cant were admitted into the Society.

Mr. W. L. Distant announced the death of Dr. Signoret of Paris, one of the Honorary Fellows of the Society.

Dr. Sharp exhibited male and female specimens of an abnormal form of *Rhomborhina japonica*, found in Japan by Mr. G. Lewis. They exhibited a contraction of the thorax, which was much narrower than usual at the base, so that the mesothoracic epimera were entirely exposed. Dr. Sharp also exhibited a small collection of Coleoptera made by Dr. N. Manders in the Shan states, Upper Burmah; this collection contained several new interesting forms, the most remarkable being a small Heteromerous insect bearing a considerable resemblance to *Rhysodes*. Amongst the specimens was an example of *Batocera roylei*, which he had retained in a relaxed condition, so that the Fellows might have an opportunity of hearing its stridulation; this was produced in a very audible manner by the base of

the prothorax passing backwards and forwards over a striated space at the base of the scutellum.

Mr. C. O. Waterhouse exhibited, for Mr. Frohawk, a series of wings of British Butterflies, prepared in accordance with a process (described by Mr. Waterhouse in the Proc. Ent. Soc. 1887, p. xxiii), by which they were denuded of their scales so as to expose the neuration.

Dr. P. B. Mason exhibited cocoons of a species of spider,—*Theridion pallens*, Black.,—from Cannock Chase, distinguished by the presence of large blunt processes on their surface.

Mr. H. Goss exhibited, for Mr. N. F. Dobrée, a number of scales of *Coccidæ*, picked off trees of *Acacia melanoxylon* and *Grevillea robusta*, growing in the Market Square, Natal. These scales had been referred to Mr. J. W. Douglas, who expressed an opinion that they belonged to the Fam. *Brachyscelidæ*, and probably to the genus *Brachyscelis*, Schrader. He said that most of the species lived on *Eucalyptus*.

Captain H. J. Elwes exhibited a long and varied series of *Terias hecabe*. He remarked that all the specimens which had strongly defined chocolate markings were taken in the cold and dry season, and that those which were without, or almost without, markings were taken in the hot and wet season. Capt. Elwes further observed that he believed that many specimens which had been described as distinct were merely seasonal forms of this variable species. Mr. W. L. Distant, Mr. F. D. Godman, Prof. Meldola, Mr. H. T. Stainton, and Mr. G. Lewis took part in the discussion which ensued.

Mr. W. Dannatt exhibited specimens of *Thaumantis Howqua*, West, from Shanghai.

Mr. H. Burns exhibited, and made remarks on, a number of nests of living ants of the following species, viz., *Formica fusca*, *Lasius alienus*, *L. flavus*, *L. niger*, *Myrmica ruginodis*, *M. scabrinodis*, &c. One of the nests contained a queen of *L. flavus* which had been in the exhibitor's possession since September, 1882.

Mr. G. C. Bignell communicated a paper entitled "Description of a new species of British *Ichneumonidæ*."

Mr. A. G. Butler communicated a paper entitled "A few words in reply to Mr. Elwes' statements respecting the incorporation of the Zeller Collection with the General Collection of Lepidoptera in the Natural History Museum." Capt. Elwes, Mr. Stainton, Mr. Godman, and others took part in the discussion which ensued.—H. Goss and W. W. Fowler, *Joint Hon. Secs.*

Natterer's Bat.
Vespertilio nattereri.

L. Hutchinson lith. West, Newman & Co. imp.